Serial No.: 10/616,268
Group Art Unit: 2814

AMENDMENTS TO CLAIMS

Please amend claims 8, 24 and 39 as indicated below. A complete listing of all claims and their status in the application are as follows:

1. (previously presented) A method of forming a solder bump, comprising the steps of:

providing a structure;

forming a metal bond pad on the structure;

forming a patterned cover layer over the structure; the patterned cover layer including an opening exposing a portion of the metal bond pad; the patterned cover layer opening including side walls; the patterned cover layer being comprised of a polyimide/benzocyclobutene stack;

forming a metal cap layer over at least the exposed portion of the metal bond pad and the patterned cover layer side walls; and

forming a solder bump over the metal cap layer.

2. (original) The method of claim 1, wherein the structure is a semiconductor wafer.

3. (original) The method of claim 1, wherein the structure is comprised of silicon or germanium.

4. (previously presented) The method of claim 1, wherein the metal bond pad is comprised of aluminum or AlSi; the metal cap layer is comprised of aluminum or AlSi; and the solder bump is comprised of a tin lead alloy (SnPb), a tin silver copper alloy (SnAgCu), a tin silver alloy (SnAg) or a tin copper (SnCu).

5. (previously presented) The method of claim 1, wherein the metal bond pad is comprised of aluminum; the metal cap layer is comprised of aluminum; and the solder bump is comprised of a tin silver copper alloy (SnAgCu).

6. (original) The method of claim 1, wherein the metal bond pad and the metal cap layer are each comprised of the same metal.

7. (original) The method of claim 1, wherein the metal bond pad has a thickness of from about 0.5 to 1.5 μm; the patterned cover layer has a thickness of from about 5.0 to 10.0 μm; and the metal cap layer has a thickness of from about 0.5 to 1.0 μm.

8. (currently amended) The method of claim 1, wherein the metal bond pad has a thickness of from about 1.0 to 1.5 μm; the patterned cover layer has a thickness of from about 5.0 to 6.0 μm; and the metal cap layer has a thickness of from about 0.8 to 1.0 μm.

9. (original) The method of claim 1, wherein the patterned cover layer opening has a width of from about 30 to 90 μm.

10. (original) The method of claim 1, wherein the patterned cover layer opening has a width of from about 30 to 60 μm.

11. (original) The method of claim 1, wherein the metal cap layer is formed by sputtering.

12. (original) The method of claim 1, including the step of:

subjecting the metal cap layer to a double zincation process.

13. (original) The method of claim 1, including the step of subjecting the metal cap layer to a double zincation process to form:

a double zincation activated surface on the metal cap layer;

an electroless nickel layer on the double zincation activated surface; and

an immersion gold layer on the electroless nickel layer.

14. (original) The method of claim 1, including the step of subjecting the metal cap layer to a double zincation process to form:

a double zincation activated surface on the metal cap layer;

an electroless nickel layer on the double zincation activated surface; the electroless nickel layer having a thickness of about 4.8 to 5.2 μm; and

an immersion gold layer on the electroless nickel layer; the immersion gold layer having a thickness of about 0.09 to 0.11 μm.

15. (original) The method of claim 1, including the step of subjecting the metal cap layer to a double zincation process to form:

a double zincation activated surface on the metal cap layer;

an electroless nickel layer on the double zincation activated surface; the electroless nickel layer having a thickness of about 5.0 μm; and

an immersion gold layer on the electroless nickel layer; the immersion gold layer having a thickness of about 0.10 μm.

16. (original) The method of claim 1, including the step of reflowing the solder bump to form a rounded solder bump.

17. (previously presented)A method of forming a solder bump, comprising the steps of:

providing a structure;

forming a metal bond pad on the structure;

forming a patterned cover layer over the structure; the patterned cover layer including an opening exposing a portion of the metal bond pad; the patterned cover layer opening including side walls; the patterned cover layer being comprised of a polyimide/benzocyclobutene stack;

forming a metal cap layer over at least the exposed portion of the metal bond pad and the patterned cover layer side walls;

subjecting the metal cap layer to a double zincation process; and

forming a solder bump over the metal cap layer.

18. (original) The method of claim 17, wherein the structure is a semiconductor wafer.

19. (original) The method of claim 17, wherein the structure is comprised of silicon or germanium.

20. (previously presented)The method of claim 17, wherein the metal bond pad is comprised of aluminum or AlSi; the metal cap layer is comprised of aluminum or AlSi; and the solder bump is comprised of a tin lead alloy (SnPb), a tin silver copper alloy (SnAgCu), a tin silver alloy (SnAg) or a tin copper (SnCu).

21. (previously presented)The method of claim 17, wherein the metal bond pad is comprised of aluminum; the metal cap layer is comprised of aluminum; and the solder bump is comprised of a tin silver copper alloy (SnAgCu).

22. (original) The method of claim 17, wherein the metal bond pad and the metal cap layer are each comprised of the same metal.

23. (original) The method of claim 17, wherein the metal bond pad has a thickness of from about 0.5 to 1.5 μm; the patterned cover layer has a thickness of from about 5.0 to 10.0 μm; and the metal cap layer has a thickness of from about 0.5 to 1.0 μm.

24. (currently amended) The method of claim 17, wherein the metal bond pad has a thickness of from about 1.0 to 1.5 μm; the patterned cover layer has a thickness of from about 5.0 to 6.0 μm; and the metal cap layer has a thickness of from about 0.8 to 1.0 μm.

25. (original) The method of claim 17, wherein the patterned cover layer opening has a width of from about 30 to 90 μm.

26. (original) The method of claim 17, wherein the patterned cover layer opening has a width of from about 30 to 60 μm.

27. (original) The method of claim 17, wherein the metal cap layer is formed by sputtering.

28. (original) The method of claim 17, wherein the subjection of the metal cap layer to a double zincation process forms:

a double zincation activated surface on the metal cap layer;

an electroless nickel layer on the double zincation activated surface; and

an immersion gold layer on the electroless nickel layer.

29. (original) The method of claim 17, wherein the subjection of the metal cap layer to a double zincation process forms:

a double zincation activated surface on the metal cap layer;

an electroless nickel layer on the double zincation activated surface; the electroless nickel layer having a thickness of from about 4.8 to 5.2 μm; and

an immersion gold layer on the electroless nickel layer; the immersion gold layer having a thickness of from about 0.09 to 0.11 μm.

30. (original) The method of claim 17, wherein the subjection of the metal cap layer to a double zincation process forms:

a double zincation activated surface on the metal cap layer;

an electroless nickel layer on the double zincation activated surface; the electroless nickel layer having a thickness of about 5.0 μm; and

an immersion gold layer on the electroless nickel layer; the immersion gold layer having a thickness of about 0.10 μm.

31. (original) The method of claim 17, including the step of reflowing the solder bump to form a rounded solder bump.

32. (previously presented) A method of forming a solder bump, comprising the steps of:

providing a structure;

forming a metal bond pad on the structure;

forming a patterned cover layer over the structure; the patterned cover layer including an opening exposing a portion of the metal bond pad; the patterned cover layer opening including side walls; the patterned cover layer being comprised of a polyimide/benzocyclobutene stack;

forming a metal cap layer over at least the exposed portion of the metal bond pad and the patterned cover layer side walls;

subjecting the metal cap layer to a double zincation process to form:

a double zincation activated surface on the metal cap layer;

an electroless nickel layer on the double zincation activated surface; and

an immersion gold layer on the electroless nickel layer;

and

forming a solder bump over the immersion gold layer.

33. (original) The method of claim 32, wherein the structure is a semiconductor wafer.

34. (original) The method of claim 32, wherein the structure is comprised of silicon or germanium.

35. (previously presented) The method of claim 32, wherein the metal bond pad is comprised of aluminum or AlSi; the metal cap layer is comprised of aluminum or AlSi; and the solder bump is comprised of a tin lead alloy (SnPb), a tin silver copper alloy (SnAgCu), a tin silver alloy (SnAg) or a tin copper (SnCu).

36. (previously presented) The method of claim 32, wherein the metal bond pad is comprised of aluminum; the metal cap layer is comprised of aluminum; and the solder bump is comprised of a tin silver copper alloy (SnAgCu).

37. (original) The method of claim 32, wherein the metal bond pad and the metal cap layer are each comprised of the same metal.

38. (original) The method of claim 32, wherein the metal bond pad has a thickness of from about 0.5 to 1.5 μm; the patterned cover layer has a thickness of from about 5.0 to 10.0 μm; and the metal cap layer has a thickness of from about 0.5 to 1.0 μm.

39. (currently amended) The method of claim 32, wherein the metal bond pad has a thickness of from about 1.0 to 1.5 μm; the patterned cover layer has a thickness of from about 5.0 to 6.0 μm; and the metal cap layer has a thickness of from about 0.8 to 1.0 μm.

40. (original) The method of claim 32, wherein the patterned cover layer opening has a width of from about 30 to 90 μm.

41. (original) The method of claim 32, wherein the patterned cover layer opening has a width of from about 30 to 60 μm.

42. (original) The method of claim 32, wherein the metal cap layer is formed by sputtering.

43. (original) The method of claim 32, including the step of reflowing the solder bump to form a rounded solder bump.

44. (original) The method of claim 32, wherein:
the electroless nickel layer has a thickness of from about 4.8 to 5.2 μm; and
the immersion gold layer having a thickness of from about 0.09 to 0.11 μm.

45. (original) The method of claim 32, wherein:
the electroless nickel layer has a thickness of about 5.0 μm; and
the immersion gold layer having a thickness of about 0.10 μm.

Claims 46-75 (cancelled)